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TABLES

for Technical Writers

by E. vH. LARSON

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FOREWORD

Practically every publication we issue contains tables of some sort. Tables offer a convenient way of presenting many kinds of information. And tables are badly abused. There are few places a writer can go to find out how to construct clear, compact, easy-to-read tables; and how to use them.

The purpose of this paper is to present as simply as possible some of the main principles of tabular presentation. Since the tables used by technical writers are so varied in nature, we realize that no ironclad rules are possible. Every table is an individual problem; and you may often find it necessary to depart from the suggestions offered in this paper. However, in the long run the principles set forth here will be applicable to most tables.

In preparing this paper, the author obtained valuable guidance from a manuscript on tables prepared by the late C. F. Hunn, former technical editor of the U.S. Forest Service. A number of the examples used here were taken from Hunn's material.

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TABLES FOR TECHNICAL WRITERS

by
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WHAT IS A TABLE?

Often you have to present a mass of related material that would be quite confusing if you ran it together in a paragraph. Such data will be easier to read if you present them in some tabular form. Material in tabular form is easy to read because the data are in orderly columns. The reader can quickly grasp the limits, trends, contrasts, comparisons, and correlations shown by the data.

THE LIST

Suppose you have to enumerate three or more terms. It the terms are long or complicated, they may be hard to read if you write them down in a paragraph. Take this example:

> The data should be tabulated in eight columns, designated as follows: Diameter class; number of trees at first inventory; number of trees at second inventory; number of trees removed during the period; number of trees at second inventory, plus those removed--(3) + (4); number of trees at second inventory, plus those removed and minus the number at the first inventory --(5) - (2); number of cubic feet (or board feet) per tree from volume table; cubic-foot (or board-foot) increment per diameter class--(6) x (7).

Hard reading? It certainly is. If you were going to use these instructions, your first step would probably be to make a list of them:

Tabulate the data in eight columns, designated as follows:

1. Diameter class
2. Number of trees at first inventory
3. Number of trees at second inventory
4. Number of trees removed during the period
5. Number of trees at second inventory, plus those removed (3 + 4)
6. Number of trees at second inventory, plus those removed and minus the number at the first inventory (5 - 2)
7. Number of cubic feet (or board feet) per tree, from volume table
8. Cubic-foot (or board-foot) increment per diameter class (6 x 7).

In the list form each item stands out. It is easier to read.

THE TABULATION

Sometimes the items you want to enumerate may include quantities. If run together in a paragraph, they would read something like this:

> New England region, 27,273,000 acres; Middle Atlantic region, 27,139,000 acres; Lake region, 55,895,000 acres; Central region, 64,249,000 acres; South region, 190,758,000 acres; Pacific Coast region, 66,685,000 acres; North Rocky Mountain region, 32,329,000 acres; South Rocky Mountain region, 30,570,000 acres.

This is also hard to read until you convert it into tabular form. This material needs two columns. It becomes a tabulation:

Region	Thousand acres
New England	27,273
Middle Atlantic	27,139
Lake	55,895
Central	64,249
South	190,758
Pacific Coast	66,685
North Rocky Mountain	32,329
South Rocky Mountain	30,570

In this tabular form the repetition is weeded out, each item stands out clearly, and it is easy to read.

You probably will not often need more than two or three columns in a tabulation. However, a tabulation may consist of as many as four columns. Example:

...the volumes per acre were as follows:

Condition class	Board feet	Tons	Cubic feet
Saw timber	5,571	26.6	1,850
Pole timber	689	14.6	710
Seedling and sapling	705	6.1	352

When the columns in a tabulation have both a title and a unit of measure, they are treated this way:

...with a safety factor of six times for logging service, the rated strengths of plow-steel wire ropes, by sizes, are:

Rope diameter (Inches)	Safe load (Tons)
3/8	1.1
1/2	1.8
5/8	3.0
3/4	4.3
7/8	5.8
1	7.5

You will notice that in the sample tabulations already given there is a title over each column. If the material is self-explanatory, or is already explained in the text, you can omit the column titles--or at least that over the first column. Examples:

...map and cruise data showed the following distribution of budworm hazard areas:

	Percent
High vulnerability	22
Medium vulnerability	5
Low vulnerability	40
No hazard	33

...the value added by manufacture in 1943 amounted to:

Planing mills	$1,259,200
Furniture manufacture	3,656,200
Other wood manufacture	1,000,000
Paper box manufacture	1,769,000
Total	$7,684,400

Since a tabulation or a list is a part of the text, the text should lead the reader directly into it. See how this is done in the examples given on this page. For ease of reading, the tabulation should not be separated from its text; whenever possible, it should be on the same page with the lines that introduce it.

THE TABULATION-TABLE

Sometimes you may have data that require only one or two columns. This is not enough for a table, and should be presented in a tabulation. Yet, it may be so long that a tabulation would waste a lot of space. Or it may interrupt a series of tables, and would look better as a table. In such cases you can double it up or triple it up, give it a number and a title, and arbitrarily make a table out of it. Example:

Table 1.--Lumber produced in Binks County, 1920-32

Year	Lumber produced	Year	Lumber produced	Year	Lumber produced
	M bd.ft.		M bd.ft.		M bd.ft.
1920	40.6	1925	38.8	1930	37.4
1921	44.1	1926	42.0	1931	41.9
1922	46.7	1927	33.9	1932	39.2
1923	34.0	1928	43.4		
1924	45.5	1929	42.6	Total	530.1

Actually this is a tabulation, because year and lumber produced are the only two elements; but it has been put into table form. Notice the vertical double rules. They indicate that you should not read across all six columns. Here is another tabulation that was made into a table because it occurred in a series of other tables:

Table 2.--Unfavorable characteristics of farm and urban dwellings in the United States, 1940

Deficiency	Farm	Urban
	Percent	Percent
Overcrowded (more than 1.5 persons per room)	16	6
Lack electric lighting	68	4
Lack running water	82	6
Lack mechanical refrigeration	85	44
Lack flush toilet	89	27
Lack bath	88	22

THE TABLE

Items enumerated in one column form a list; data presented in two columns form a tabulation. A tabulation may have as many as three data columns. But, if you need more than three data columns to present the material, you must use a table. By definition (for official publication by the Department of Agriculture) a table is a schedule or arrangement of data in three or more columns.

Here is a simple form of table:

Table 3.--Quality of virgin timber stands in the United States, 1945

Region	Area	Quality of stand		
		Good	Medium	Poor
	Million acres	Percent	Percent	Percent
Pacific Northwest	18.5	39	40	21
California and Rocky Mountain regions	22.8	12	36	52
North	2.3	19	54	27
South	1.0	55	34	11

A table consists of four main parts:

1. Number and title.

Table 3.--Quality of virgin timber stands in the United States, 1945

2. Box head.

Region	Area	Quality of stand		
		Good	Medium	Poor

3. Stub, or first column.

Pacific Northwest
California and Rocky Mountain regions
North
South

4. Data columns.

Million acres	Percent	Percent	Percent
18.5	39	40	21
22.8	12	36	52
2.3	19	54	27
1.0	55	34	11

Each of these parts will be discussed separately.

THE MAIN PARTS OF A TABLE

NUMBER

Every table must be designated by a number. Use arabic numerals, never letters or roman numerals. Example:

Table 4.--Consumption of veneer in the United States, 1940

All tables in a publication--including those in the appendix--are numbered consecutively.1/ Many writers number their tables correctly until they get to the appendix; then they abruptly change horses and gallop off in a new direction. They refer to "Table A", or "Appendix Table XVIII", or even "Appendix Table IV-B". This is not correct. Number all tables consecutively, including those in the appendix.

TITLE

Table titles should be typed double-space, so they are easy to read. Underscoring is desirable but not imperative. No period is used at the end of the title. A short title can be centered over the table. In longer tables the extra lines can be indented. Examples:

Table 5.--Lumber consumed in the United States, 1936

Table 6.--Switch and bridge ties laid by railroads in the United States, 1927

Table 7.--New wood-pulp content of various kinds of paper and paperboard manufactured in the United States in 1943 and 1944, and the estimated content in 1950-55

The style and content of a table title depend on the data and how they are being used. In general, the rule is: Table titles should be as clear, simple, and brief as possible. They should emphasize the significant features of the data, and the chief limiting factors.

A table title is like a newspaper headline. It should tell in a few words what is to follow. It should not use any unnecessary words. Since the first two or three words in the title are the most emphatic,

---

1/ The only exceptions are footnote tables, which generally have neither number nor title unless they are quoted.

they should tell the main feature of the table. Here are two samples, one poor because it is slow in getting to the point, the other brief, clear, and direct:

POOR Table 8.--Total amount of lumber in board feet consumed in all mines in the United States in the 5-year period 1940 to 1944, inclusive

BETTER Table 8.--Lumber used by mines in the United States, 1940-44

The limiting factors are usually of great importance. Place, time, and agent are the most common limiting factors. Notice these factors in the above example. The main feature of the table is "lumber used." The data are limited to that lumber used "by mines" (agent); the place is limited to "the United States"; the data are limited in time to "1940-44."

The time limitation is especially important, because it tells the reader the scope and timeliness of the data. The time element is usually placed last in the title. There are several rules for the use of such time elements:

1. "1940-44" means 1940 to 1944 inclusive. It is not necessary to add "inclusive."

2. Nonconsecutive years should be indicated "1927 and 1936," or "1931, 1935, 1937, and 1940," or (if more than 3 or 4 years are given) "specified years, 1931-40."

3. Noncalendar years should be specified, as "Fiscal years 1931-40" or "April 1, 1931 - March 31, 1941."

On the following page are a few examples of poor table titles, with the improved titles for comparison. The poor titles range from those that tell practically nothing to those that try to tell everything--and get all tangled up doing it.

VAGUE Forest lands burned over

BETTER Forest lands burned over, Ohio River basin, 1931-40

FUMBLING Increase and decrease in steam railroad track mileage operated in the United States, by years, 1911-43

BETTER Track operated by steam railroads in the United States, 1911-43

HORRIBLE Relationship between the mean percentage chick weight of egg weight in eggs producing males and the mean percentage chick weight of egg weight in eggs producing females, in each of four groups; and the relationship between the mean percentage chick weight of egg weight in eggs producing males and females, respectively, in each breed

BETTER Mean ratios of chick weight to egg weight, compared for eggs of pullets and yearling hens of two breeds and for male and female chicks produced

If the table that followed the above titles were properly constructed, the title could probably be reduced to something like this:

Relationship of egg weight to chick weight

BOX HEAD

The items contained in the box head are nothing more than captions for the columns under them. Each heading should be brief and complete. The ideal to strive for is a single tier of box headings, each of which contains as few words as possible--preferably not more than five. Use short, simple words whenever possible. Capitalize only the first word. Here is a simple one-tier box heading:

Age	Spacing	Trees per acre	Average d.b.h.	Average height	Yield per acre

Of course your data are not often that simple. You may need another tier to label the data adequately. Example:

Year	Residential construction		Nonresidential construction		Total lumber required
	Rural	Urban	Rural	Urban	

Seldom should you need more than two tiers in the box head. If you need four or five tiers, there is probably something wrong with the table.

Box heads should always be ruled both horizontally and vertically. This sets off each heading and makes the table clear. In typing tables the colon may be used, as above, in place of a vertical line.

There are several general rules for the use of box heads.

1. A heading should always cover more columns than any subheading below it:

	Hardwoods			Softwoods	
	Saw timber	Pole timber	Seedlings	Saw timber	Pole timber

2. Headings should read down from the general to the particular, or from the more important to the less important:

Imports from Canada		
Newsprint	Wood pulp	Pulpwood

3. No space in the box head should be left blank. If the terms in the column below are so varied that you cannot find a general label for them, use "Item" for the heading:

Item
Volume per acre
Trees per acre
Average age
Vigor class

4. When a box heading reads into the boxes below, it is followed by a dash:

Defect-free pieces at cutting angle of--				
5°	10°	15°	20°	25°

Here are several sample tables. Notice the faults in the box heads of each, and how they are corrected.

Table 9.--Mine timbers consumed, by kinds of wood, 1905 and 1923

Reports received	Mines (5,163)		Establishments (6,348)	
	1905		1923	
	Round	Sawed	Round	Sawed
	Cubic feet	M board feet	Cubic feet	M board feet
Softwoods:				
Pine	19,100,000	96,602	32,918,240	114,942
Tamarack	--	--	6,289,917	10,384

There are two main faults in the above box head: (1) It must be read across, from "Reports received" to "Mines" and "Establishments"; and (2) it has headings and subheadings of the same length. Moreover, the dates 1905 and 1923 are more important than the source of the data, and should not be put below it. Compare it with this correct box head.

Table 9.--Mine timbers consumed, by kinds of wood, 1905 and 1923

Kind of wood and species	1905 (Basis: reports from 5,163 mines)		1923 (Basis: reports from 6,384 establishments)	
	Round	Sawed	Round	Sawed
	Cubic feet	M board feet	Cubic feet	M board feet
Softwoods:				
Pine	19,100,000	96,602	32,918,240	114,942
Tamarack	--	--	6,289,917	10,384

Here is another poor one:

Table 10.--Steam railways in the United States, 1910-22

	Length in miles						
	1910	1912	1914	1916	1918	1920	1922
Total road mileage	240,293	246,777	252,105	254,037	253,529	252,845	250,413
Total track mileage	351,767	371,238	387,208	397,014	402,343	406,579	409,395
Increase in track mileage	--	19,471	15,970	9,806	5,329	4,236	2,708

The main faults in this table are: (1) The title is misleading and incomplete; (2) there is a blank space in the box head; (3) the unit of measure, "Length in miles," does not belong in the box head. Here is an improved version:

Table 10.--Steam railway mileage in the United States, by specified years, 1910-22

Year	Total road mileage	Total track mileage	Increase in track mileage
	Miles	Miles	Miles
1910	240,293	351,767	--
1912	246,777	371,238	19,471
1914	252,105	387,208	15,970
1916	254,037	397,014	9,806
1918	253,529	402,343	5,329
1920	252,845	406,579	4,236
1922	250,413	409,359	2,780

Here is the kind of table that will make your typist start looking for another job. Is is so topheavy the reader will probably give up before he ever gets down to the data.

Table 11.--Source of newsprint consumed in the United States: Consumption expressed in paper tons of 2,000 pounds

Year	United States consumption	From domestic pulpwood		Imported from--									
				Canada						Norway, Sweden, Finland, and Germany			
				Manufactured in United States from--				Newsprint		Manufactured in United States from--		Newsprint	
				Pulpwood		Wood pulp				Wood pulp			
	Quantity	Quantity	Ratio to total consumption	Quantity	Ratio to total consumption	Quantity	Ratio to total consumption	Quantity	Ratio to total consumption	Quantity	Ratio to total consumption	Quantity	Ratio to total consumption
	Tons	Tons	Percent	Tons	Percent	Tons	Percent	Tons	Percent	Tons	Percent	Tons	Percent
1917	1,824,000	767,000	42	221,000	12	272,000	15	557,863	31	98,000	5	1,250	5
1918	1,760,000	771,000	44	214,000	12	254,000	14	595,849	34	21,000	1	166	7
1919	1,892,000	838,000	44	279,000	15	224,000	12	627,687	35	33,000	2	--	4

It can be made easy to read. That ponderous box head can be boiled down to this:

Table 11.--Newsprint consumption in the United States: Sources of raw material, 1917-19

Year	Total consumption	From domestic pulpwood	Imports from Canada						Imports from Norway, Sweden, Finland, and Germany			
			Pulpwood[1/]		Wood pulp[1/]		Newsprint		Wood pulp[1/]		Newsprint	
	Tons	Tons	Tons	Percent	Tons	Percent	Tons	Percent	Tons	Percent	Tons	Percent
1917	1,824,000	767,000	42	221,000	12	272,000	15	557,863	31	98,000	5	1,250	5
1918	1,760,000	771,000	44	214,000	12	254,000	14	595,849	34	21,000	1	166	7
1919	1,892,000	838,000	44	279,000	15	224,000	12	627,687	35	33,000	2	--	4

1/ Expressed in paper equivalent.

STUB COLUMN

The stub, or first column, is at the extreme left of the table. It serves the same general purpose as the box headings. Each item in the stub column labels and controls the data just as the box heading does. The difference is that the box heading labels a vertical column of data, while the stub item labels a horizontal line of data. Here is a simple stub:

Product
Newsprint
Other printing and fine papers
Coarse and industrial papers
Sanitary and tissue papers
Building board
Container board

Often the items in the stub column fall into classes or groups. Here is the usual way to treat them:

Region and state
New England:
Maine
Vermont
New Hampshire
Massachusetts
Rhode Island
Connecticut
Middle Atlantic:
New York
Pennsylvania
New Jersey
Maryland
Delaware
West Virginia

Here is another example:

Stump diameter (Inches)	At 0.5-foot height:	At 1-foot height:
7		
8		
9		
10		
11		
12		
13		
14		

Sometimes you can save space by combining two or more items in the stub column. Take the following example:

Locality	Altitude
	Feet
Granite Falls	400
Darrington	500

These items could be combined in this way to save space:

Locality and altitude (feet)
Granite Falls (400)
Darrington (500)

DATA COLUMNS

Usually you will present data in columns of figures. The unit of measure (feet, miles, acres, degrees, percent, or whatever it is) should be at the top of the data column. Example:

Thousand cords	Percent
165	8
213	11
413	21
140	7

Do not mix words or text in with columns of figures. Such items as "No record taken," "Trace," "Negligible," and "None" have no place in a column of figures. The following table is incorrect in this respect:

Table 12.--First-year drought mortality of seedlings under different light conditions, 1932 and 1933

Species	Full-sun station	Part-shade station	Full-shade station
	Percent	Percent	Percent
Western white pine	7	Negligible	0.8
Douglas-fir	No record	1	.4
Western larch	4	2	21.9
Grand fir	(1933 only) 1	None	17.5
Western red cedar	24	6	.9
Western hemlock	39	18	41.6
Average	(Fir ex-cluded) 16	5	13.8

Of course, you can put such information in a table. Here are the ways you can do it:

A blank space in a column of figures, filled in with two hyphens (--) or two dots (..) means that no record was taken.

A zero in a column means "none." It means that the amount

actually recorded was zero (0).

Footnotes can be used to add such information.

Here is an example of the same information presented correctly. Notice the use of the leader (--), the zero (0), and the footnotes.

Table 12.--First-year drought mortality of seedlings under different light conditions, 1932 and 1933

Species	Full-sun station	Part-shade station	Full-shade station
	Percent	Percent	Percent
Western white pine	7	(1/)	0.8
Douglas-fir	--	1	.4
Western larch	4	2	21.9
Grand fir	2/1	0	17.5
Western red cedar	24	6	.9
Western hemlock	39	18	41.6
Average	3/16	5	13.8

1/ Less than 0.5 percent.
2/ Records for 1933 only.
3/ Excluding grand fir.

In the above table, notice also the treatment of the decimal fractions (0.8 and .4). The rule is: Where the first number in a column, or under a cross rule, is a decimal fraction, use a zero left of the decimal point (0.8). Generally, you should also use the zero (0.8) when the figure is in a total set off from the rest of the column. But if the figure falls in a column, do not use the zero (.4).

Here is another example illustrating this rule:

	Percent	Percent	Percent
Hardwoods:			
White oak	1.6	0.21	--
Black walnut	2.0	.24	--
Beech	.7	.15	0.3
Yellow birch	.4	.02	.1
Red maple	.8	.14	1.3
Total	5.5	0.76	1.7
Softwoods:			
White pine	0.8	1.45	--
Red pine	.6	.57	--
Hemlock	.7	.03	--
Spruce	.1	.80	0.2
Longleaf	2.3	.45	.1
Total	4.5	3.30	0.3

The number of integers to the right of the decimal point should be the same throughout the column. Example:

Percent
0.217
.050
.520
.600

If the data are grouped in classes, you can put subheads in the body of the table. Put them between page-wide rules, in capitals.

Table 13.--Stump diameters in relation to d.b.h., by species

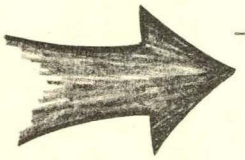
(In inches, outside bark)

D.b.h. (Inches)	White pine	Eastern hemlock	Pitch pine	White oak	Red oak	White ash	Bass-wood
			DIAMETER AT 0.5-FOOT STUMP HEIGHT				
5	7	7	7	7	7	6	6
6	8	8	8	9	8	7	7
7	9	9	9	10	10	9	8
8	10	10	10	12	11	10	9
9	12	12	12	14	13	11	11
10	13	13	13	16	14	13	12
11	14	14	14	17	16	14	13
			DIAMETER AT 1-FOOT STUMP HEIGHT				
11	13	13	13	15	14	13	12
12	14	14	14	16	15	14	13
13	15	15	15	18	16	15	15
14	17	17	17	19	18	16	16
15	18	18	18	21	19	17	17
16	19	19	19	22	20	19	18
17	20	20	20	23	22	20	20
18	22	22	22	25	23	21	21
19	23	23	--	26	24	22	22
20	25	25	--	28	26	24	23

PRESENTING DATA

UNITS OF MEASURE

Normal position.--Ordinarily units of measure in a table appear at the tops of the data columns.



Tons	Percent	Cubic feet	Board feet
450	8	3,500	10,600
600	21	5,000	14,800
320	15	3,200	9,000

General rules.--There are several general rules for the use of units of measure:

1. Underscore the unit.

2. Avoid long and complicated units such as "Man-days of 10 hours," "Thousand board feet per acre," and "Mortality percent by 1937." Usually you can work any qualifying material into headings, title, or footnotes and cut the unit down to "Man-days," "M board feet," or "Percent."

3. Spell out the units when it is practical: "Million dollars," "Cubic feet." If the table is crowded, you can double or triple up the words in the unit:

Million dollars	1,000 cubic feet	Per-cent

4. Well known abbreviations such as "M bd. ft.," "D.b.h.," "Hp." may be used. But do not use symbols such as # (number), % (percent), " (inches), and ' (feet). Do not abbreviate Number (No.).

Unit in title.--Although the normal position for units of measure is at the top of the data columns, you can sometimes put them in other parts of the table. In small tables, for example, you can often put the unit of measure in the title. Do not repeat the unit in the data columns. Examples.

Table 14.--Percent of failures on test plots

Table 15.--Number of trees per acre

Table 16.--Board-foot volume by species

Unit in headnote.--In tables where the same unit of measure applies to all the data columns, you can put the unit in a headnote at the top of the table. This is especially useful for tables that have a large number of columns. It is used mostly when the data are in large, rounded-off figures such as million dollars, billion board feet, thousand cords, etc. Do not repeat the unit in the data columns. Examples:

Table 17.--Wood used annually in manufacture of veneer

(In million board feet, log scale)

Year	Hardwoods	Softwoods	Imports	Total
1906	277	52	--	329
1907	298	39	12	349
1908	312	51	20	383

Table 18.--Slack cooperage heading produced, by species specified years, 1923-25

(Thousand sets)

Year	Red gum	Pine	Elm	Beech	Maple
1923	14.7	43.7	1.2	3.1	2.6
1925	12.0	31.9	.7	2.8	1.4

In stub heading.--Ordinarily, units of measure should not be put in the stub column. In tables where the stub items require a unit of measure, put the unit in the stud heading, in parentheses:

Species and age class (years)	Small	Medium	Large
	Percent	Percent	Percent
Sitka spruce:			
30-39	76	68	57
40-49	83	75	60

Occasionally you see a table like this--

Table 19.--Direct damage to merchantable timber by heat killing in several types of cover

Damage		Type of cover			
		Bear clover	Little brush	Medium brush	Heavy brush
Total area	acres	500	2,000	200	220
Area heavily damaged	acres	7	30	30	220
	percent	1.4	1.5	15.0	100.0
Timber killed per acre	board feet	38	220	2,100	3,350
Value of loss per acre	dollars	0.08	0.66	4.50	5.50

This table is very confusing because the units of measure are in the stub. It is impossible to read down the data columns and get any sense out of them, especially the columns far from the stub (and this table had 16 columns!). When the table is set up properly, the units are no problem.

Table 19.--Direct damage to merchantable timber by heat killing, under different cover conditions

Cover condition	Area of burn	Area of heavy damage		Timber killed per acre	Loss per acre
	Acres	Acres	Percent	Board feet	Dollars
Bear clover	500	7	1.4	38	0.08
Little brush	2,000	30	1.5	220	.66
Medium brush	200	30	15.0	2,100	4.50
Heavy brush	220	220	100.0	3,350	5.50

In stub column.--It is not always so easy to avoid having units of measure in the stub column. In an inventory form of table, the stub column is often the most convenient place to put the units. This is a good way to do it:

Table 20.--Consumption of minor wood products, 1919 and 1929

Product	1919	1929
Poles .....M pieces..	--	4,557
Shingles .....M shingles..	9,192,704	6,110,672
Veneer logs, domestic ....M feet b.m..	576,581	1,095,244
Distillation wood .....cords..	1,442,675	1,308,323
Tight staves.....M pieces..	353,835	357,293
Tight heads .....M sets..	24,274	30,329
Slack staves .....M pieces..	1,121,324	1,039,450
Slack heads .....M sets..	87,381	72,591
Hoops .....M pieces..	140,772	133,054

A word of caution. This type of inventory table is correct if only a few columns of data are used. If more than two or three data columns are used, the table will be confusing. The reader will get lost reading across the columns. The simplest way to handle such tables is to convert all the data to a common unit of measure, like cubic feet.

In box head.--In some tables "Unit of measure" can be used as a box heading. Example:

Table 21.--Potential annual requirement for timber products in the United States 50 years hence

Product	Potential requirement		Estimated drain from domestic timber	Estimated drain from saw-timber size trees
	Unit of measure	Quantity		
		Million	Million cu. ft.	Million bd. ft.
Lumber	Board feet	39,000	7,956	40,692
Pulpwood	Cords	40	3,320	10,678
Cross ties	Ties	18	194	887

WHERE TO PUT TOTALS

Normal position.--Our reading habits train us to read down the page and across the lines from left to right. A table should read the same way--down and to the right. Therefore, the normal position for totals and averages is either at the extreme right or at the bottom of the table, or both. Most tables follow this custom. Here is a table in which the total column is in normal position at the right:

Table 22.--Estimated consumption of lumber in the United States, by major uses, 1938-44

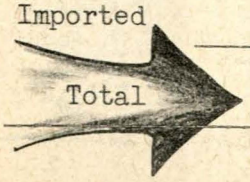
(In billion board feet)

Year	Construction	Manufacturing	Shipping	Total
1938	17.7	1.9	3.4	23.0
1939	20.3	2.3	3.8	26.4
1940	24.2	2.9	4.3	31.4
1941	28.1	3.4	5.5	37.0
1942	30.4	3.5	9.5	43.4
1943	19.8	3.5	15.2	38.5
1944	15.0	3.8	5.5	34.3

Here is a table in which the totals are in normal position at the bottom:

Table 23.--Wood required for anthracite mining in Pennsylvania, and source of material, 1943

Source	Round timber			Lumber	
	Thousand tons	Million cubic feet	Percent	Million board feet	Percent
Local	755	26.5	94	48.3	74
Imported	57	1.6	6	16.8	26
Total	812	28.1	100	65.1	100



And here is a table in which totals are in normal position both at the right and at the bottom:

Table 24.--New wood pulp consumed in paper manufacture, by type of pulp, 1944

(In thousands of tons)

Kind of paper	Ground-wood	Sulfite	Sulfate	Soda	Other	Total
Newsprint	446	79	--	--	--	525
Other printing and fine papers	1,148	956	1,262	459	--	3,825
Coarse and industrial papers	172	342	2,744	--	172	3,430
Sanitary and tissue papers	400	800	800	--	--	2,000
Building papers	--	--	--	--	750	750
All papers	2,166	2,177	4,806	459	922	10,530

Other positions.--Sometimes the totals or averages may be the most important data in the table. The other data may be merely breakdowns of these totals. You can emphasize these important totals by placing them at the top or at the left. Here are two examples:

Table 25.--Cordwood standing on cordwood and saw-timber areas, by region and kind of wood, 1944

(In millions of cords)

Region	Total cordwood	On cordwood areas			On saw-timber areas		
		Softwood	Hardwood	Total	Softwood	Hardwood	Total
Total	2,382.0	550.7	551.4	1,102.1	856.0	423.9	1,279.9
New England	149.9	14.6	42.2	56.8	20.2	72.9	93.1
Middle Atlantic	179.0	15.9	109.7	125.6	11.2	42.2	53.4
Lake	170.7	37.2	86.2	123.4	10.4	36.9	47.3
Central	252.3	10.7	145.6	156.3	5.4	90.5	95.9
South	792.3	63.0	166.9	429.9	181.8	180.6	362.4
Pacific Coast	429.8	75.4	.5	75.9	353.1	.8	353.9
North Rocky Mt.	263.2	104.6	--	104.6	158.6	--	158.6
South Rocky Mt.	148.8	29.3	.3	29.6	115.3	--	115.3

Table 26.--Character of cutting on commercial forest lands in the United States, 1945

Type of ownership	Cutting practices		
	High order and good	Fair	Poor and destructive
	Percent	Percent	Percent
All owners	23	25	52
Private:			
Small	4	25	71
Medium	8	31	61
Large	29	39	32
All private	8	28	64
Public:			
National forest	80	19	1
Other Federal	43	32	25
State and local	47	10	43
All public	67	19	14

Although either bottom-and-right or top-and-left positions are acceptable for totals, do not use any other combinations (like bottom and left, or top and right); they will be confusing. Notice in the last two tables that, regardless of where you put the totals, you must keep the subtotals in a normal position to the right of or at the bottom of the data they are related to.

AVERAGES

Averages should be treated the same way as totals. Their normal position is at the bottom or right. (See table 33, p. 38) For emphasis they may be put at the top or left.

PERCENTAGE FIGURES

Percentage figures are normally placed to the right of the data they are related to. Example:

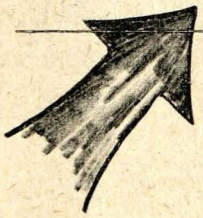
Table 27.--Average volume per acre in seedling-and-sapling stands, by species and tree form

Species	Volume in poor form		Volume in good form		Total	
	Cubic feet	Percent	Cubic feet	Percent	Cubic feet	Percent
Sugar maple	29.8	7.5	94.0	23.7	123.8	31.2
Red maple	69.8	17.6	27.0	6.8	96.8	24.4
Beech	43.2	10.9	34.4	8.7	77.6	19.6
Yellow birch	2.0	.5	--	--	2.0	.5
Yellow poplar	10.8	2.7	32.0	8.0	42.8	10.7
Black cherry	1.0	.2	12.8	3.2	13.8	3.4
Aspen	26.6	6.7	14.0	3.5	40.6	10.2
Total	183.2	46.1	214.2	53.9	397.4	100.0

If you want to present percentage figures with total figures at the bottom of the table, you should usually separate the two with a double rule. In the following example, three columns of figures show cubic feet. If no double horizontal rules were used, the percentage figures at the bottom would appear--in reading down the column--to be cubic feet. The double rule avoids confusion.

Table 28.--Average volume per acre in seedling-and-sapling stands, by diameter class

D.b.h. (Inches)	Volume in poor form	Volume in good form	Total	
	Cubic feet	Cubic feet	Cubic feet	Percent
4	28.0	10.4	38.4	18.4
5	31.8	18.6	50.4	24.1
6	16.2	36.8	33.0	25.4
7	9.4	17.0	26.4	12.6
8	27.0	13.6	40.6	19.5
Total	532.1	451.4	983.5	100.0
Percent	54.1	45.9	100.0	--



FOOTNOTES

You can use footnotes to tell extra details about the material in a table. The footnotes are placed directly under the table. Each footnote is set in paragraph form, indented. All numbers in footnotes are expressed in figures, even at the beginning of a sentence. Example:

Table 29.--Potential annual requirements for paper and paperboard, wood pulp, and pulpwood, 1950-55

Item	Paper and paperboard	Wood pulp	Pulpwood	Total fiber required 1/	
	M tons	M tons	M cords	M cords	Percent
Domestic requirement	28,000	2/ 17,890	21,751	28,929	100
Estimated imports	3/ 4,000	4/ 2,000	1,500	8,678	30
Domestic production	24,000	15,890	20,251	20,251	70

1/ In pulpwood equivalent.

2/ 17,090,000 tons for domestic paper and paperboard and 800,000 tons for other pulp-containing products.

3/ Chiefly newsprint, equivalent to 4,000,000 cords of pulpwood.

4/ Equivalent to 3,178,000 cords of pulpwood. Converted on this basis: 200,000 tons groundwood at 0.91 cord per ton; 800,000 tons sulfite at 1.82 cords per ton; 1,000,000 tons sulfate at 1.54 cords per ton.

In very wide tables--especially those you have to run broadside--you can make the footnotes easier to read by doubling them up this way:

1/ Includes off-quality pulp screenings, exploded, asplund, and defibrated type pulps.

2/ Estimate is influenced by prospect of little or no increase in sulfite mill capacity.

3/ Estimate is influenced by prospect of little or no increase in soda mill capacity.

4/ These factors are a rough average for the country as a whole; they are not generally applicable for any small subnational area.

5/ See appendix.

Numbering of footnotes.--In every table, footnotes are numbered consecutively starting with 1. The numbering of table footnotes is entirely independent of the numbering of text footnotes.[2] When footnotes to both table and text[3] fall together at the bottom of a page, the table footnotes come first, directly under the table. Separate them from the text footnotes by a line.

Example:

Table 30.--Ownership of saw timber in the United States[1] [2]

(In billion board feet)

Type of ownership	Region			U.S. total
	North	South	West	
Farm	76	134	34	244
Other private	124	183	363	670
All private	200	317	397	914
National forest	8	14	496	518
Other Federal	2	4	98	104
State and local	10	3	52	65
All public	20	21	646	687
All owners[3]	220	338	1,043	1,601

1/ This is a table footnote.
2/ From U.S. Forest Service reappraisal, 1946.
3/ This is a table footnote.

2/ This is a text footnote.
3/ This is another text footnote. These text footnotes have no relation at all to table footnotes.

Position of reference number.--Footnote references may be put in any part of a table. However, avoid putting them on units of measure, like this: M board feet[2]. Usually you can put the reference in the title, box head, or on a stub item. Here are a few general rules for the use of footnote references:

1. Put the footnote reference to the right of words.

Weight[3]

2. Put the footnote reference to the left of numbers.

[4]34.7

3. When the footnote reference stands alone in a column of data, put it in parentheses.

11
7
([5])
3
10

4. If two references come in the same place, separate them with a space.

Distribution[1] [2]

In the typing of footnote references in tables, the main consideration is to make sure the reference number or symbol is on the word or figure the footnote refers to. For this reason, the typist should place the reference number or symbol as close to its item as possible. If they are separated by two or three spaces, the reader may be confused. Example:

Total [4] 1,586.4

Here it is impossible to tell whether footnote 4 will say something about the total or about the figure 1,586.4. Either of the following treatments will remove this possibility of confusion:

Total[4] 1,586.4 Total [4]1,586.4

Although space will not always permit, the footnote reference number should be raised slightly. Often this will avoid confusion. The following examples show why this is desirable.

CONFUSING: Total[1] ... forest land, 1941-42[2]

BETTER: Total[1] ... forest land, 1941-42[2]

Sequence in table.--The sequence of footnote references in a table should be from left to right and from the top down. In box heads the numbering goes from main heading to subheading. Below the box head the numbering goes from left to right by lines. The following table illustrates the proper sequence of footnote references.

Table 31.--Current annual timber growth in the United States, and growth goals by regions[1]

Region[2]	All timber[3]		Saw timber[6]	
	Growth goal[4]	Current growth[5]	Growth goal[7]	Current growth[8]
	Billion cubic feet	Billion cubic feet	Billion board feet	Billion board feet
New England	1.14	[9]0.90	4.0	1.8
Middle Atlantic	1.64	1.40	5.8	2.7
Lake	1.15	[11].81	3.1	1.4
Central[10]	1.73	[11]1.44	4.5	[12]2.3
Plains	.12	.12	.2	.2
South Atlantic	[13]2.14	1.76	[14]7.8	6.1
Southeast	4.80	2.71	17.5	8.2
West Gulf	3.20	1.92	12.1	5.6
Pacific Northwest[15]	2.55	1.24	11.4	4.2
California	.64	.33	2.8	1.2
North Rocky Mt.	.65	.54	1.9	1.3
South Rocky Mt.	.24	.20	.9	.3
United States total	20.00	13.37	[16]72.0	35.3

Symbols.--In some tables (containing chemical formulas, complicated mathematical figures, etc.) the use of numbers for footnote references might cause confusion. To avoid this you can use asterisks (*), daggers (†), or letters (a/). If you use these symbols in the same table with numbered references, the numbered footnotes come first. Example:

1/ For converting factors see table 25.
2/ Does not include white pine.

* Less than 0.5.

Unnumbered footnotes.--You can also use footnotes without any reference number or symbol to tell general information that applies to the whole table, such as the source of the data:

1/ Total includes farm, residential, and all other nonfarm construction.
2/ Boxes, crating, and dunnage.

Source: U.S. Forest Service data.

Columns of reading matter may be put in any part of a table. Example:

Table 32.--Soil erosion in relation to surface conditions

Plot number	Condition			Erosion recorded	
	Ground surface	Slope	Exposure	Depth	Degree
		Degrees		Inches	
151	Fine gravel	3	NE	0.50	Normal
163	do.	2	NE	1.00	Advanced
167	Small stones	20	S	3.00	Excessive
175	do.	6	SW	3.00	Do.

The descriptive material in reading columns should be brief and telegraphic in style. If you cannot make the items brief, reconsider; maybe they do not belong in a table at all. Reading matter must not be mixed into a column of data figures.

In the above table, notice the use of "do." (ditto). "Do." is used only in reading columns, never with numbers or letters. Symbols such as "NE" constitute reading columns, but do not take "do." In the stub column and in the last column, "Do." is capitalized, but never in any other columns. Quotation marks (") may be used instead of "do."

BASIS AND SOURCE DATA

Occasionally you may want to introduce in a table the source of your data or the basis on which you computed it. Such information will help the reader to evaluate your data, its scope and limitations. Some typical examples are: "Number of mills reporting," "Number of parent trees," and "Number of samples taken."

When such basis and source information helps to describe the items in the stub column, it is usually placed in a column at the extreme right of the table. In the following example, the number of trees measured shows the basis on which the data are founded.

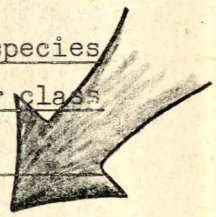
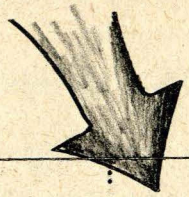


Table 33.--Mean annual diameter growth of all species 4 inches d.b.h. and larger, by vigor class

Vigor class	10 years before thinning	2-4 years after thinning	Basis: trees measured
	Inches	Inches	Number
I	0.18	0.22	169
II	.11	.15	342
III	.08	.10	139
Average	0.12	0.15	217

If the source information is related to the box headings, you can't very well run it in a column. You have to run it across the table someplace. Where? You have to figure that out to fit the particular table. There is no general rule, but here are two ways you can do it. The first is to combine the source information with the box heading.



Kind of wood and species	1905 (Basis: reports from 5,163 mines)		1923 (Basis: reports from 6,384 establishments)	
	Round	Sawed	Round	Sawed

Here is another way it can be done:

Table 34.--Hardwood lumber production in King County, by species, 1935-38[1/]

Species	1935 (8 mills)	1936 (7 mills)	1937 (6 mills)	1938 (6 mills)
	M bd. ft.	M bd. ft.	M bd. ft.	M bd. ft.
Cottonwood	167	305	850	500
Elm	75	28	28	--
Oak	255	164	127	--
Sycamore	20	40	45	--
Walnut	4,415	7,703	9,320	4,885
All other	92	136	119	--
Total	5,024	8,376	10,489	5,385

1/ Number of mills reporting indicated for each year.

If it seems inconvenient to combine the basis information with box headings, you can put it at the bottom of the table. Separate it from the rest of the table by a double rule, and put the unit of measure (usually "number") in each column. Here is the same table treated in this way.

Table 34.--Hardwood lumber production in King County, by species, 1935-38

Species	1935	1936	1937	1938
	M bd.ft.	M bd.ft.	M bd.ft.	M bd.ft.
Cottonwood	167	305	850	500
Elm	75	28	28	--
Oak	255	164	127	--
Sycamore	20	40	45	--
Walnut	4,415	7,703	9,320	4,885
All others	92	136	119	--
Total	5,024	8,376	10,489	5,385
	Number	Number	Number	Number
Basis: mills reporting	8	7	6	6

RULING OF TABLES

Ruling, both horizontal and vertical, should be kept to the bare minimum in typewritten tables.

Horizontal ruling.--Horizontal lines are used as follows:

Single rules (————————):

1. To set off box heads at the top of the table.
2. To indicate addition or subtraction. (See table 24, p. 27; and table 29, p. 32.)
3. At the bottom of the table.
4. To set off subheads. (See table 13, p. 21.)

Double rules (========):

1. To set off totals or other items at the top of the table. (See table 25, p. 28.)
2. To set off subtotals. (See table 30, p. 33.)
3. To set off independent items at the bottom of the table. (See table 28, p. 31; and table 34, p. 40.)

Do not extend any summation rules into the stub column.

Vertical ruling.--There is little need for vertical ruling of typewritten tables. Vertical ruling takes time, and seldom improves the appearance of the table. There are only two general uses for vertical ruling in typewritten tables:

1. The items in the box head should be set off by some kind of vertical rules. Colons may be used instead of an unbroken line.
2. Double vertical lines are used to indicate that the data are not to be read across all columns. They are used mostly in doubled-up tables. (See table 1, p. 4.)

HOW TO USE TABLES

You should consider two general factors in using a table: (1) the relation of the table to the text, and (2) the relation of the table to the printed page.

RELATION OF TABLE TO TEXT

Text and tables are closely related. The text ordinarily tells the reader the broader aspects of the subject. The tables usually give information in finer detail. They illustrate; they give basic data from which the reader can make his own evaluations; and often they show complex relationships that you cannot put into words. They can be the extra punch to drive the point home.

Ease of reading is a big consideration in use of both text and tables. The text should read smoothly, telling completely what you can tell in text. It should make sense without the tables. Each table should supplement the text. Each table should be complete in itself, easy to read and easy to understand.

To make the text easy to read, try to keep your references to tables parenthetical, like this:

> "In these second-growth plots 74 percent of the damage by browsing was done by rabbits, and only 20 percent was done by deer (table 3)."

This is relatively easy reading. It tells you what happened. And it tells you--in case you are interested--just where you can find more detailed data about it. Too many writers fail to hold their tables to this supplementary position. They seem to write directly from their tabular data, and they turn out stuff like this:

> "Table 3 and table 4 show graphically the ratio of damage done by rabbits to the damage done by deer in these second-growth plots. The effect of this damage on growth is shown in table 5."

This is not hard to read, but what does it tell the reader? Actually, nothing. The writer is obviously fond of his tables, and would force his reader to become acquainted with them. That isn't very kind to the reader. To make any sense out of it he has to shuffle back and forth between text and tables, trying to figure out what the writer wants to say but is too lazy to write. In effect, the writer of stuff like this tells his readers: "It's all there someplace; dig it out for yourself." If the reader has no burning interest in the subject, he will drop it right there.

Remember the reader. Also, bear in mind that small, simple tables and tabulations are easier to read--and easier to understand--than big, complicated tables.

MAKE THE TABLE FIT THE PAGE

The table must fit the page for which it is intended. If possible it should be upright, so the reader will not have to twist the page around. Of course, many tables are of such a nature that they must be printed broadside. Some are so big they must be printed on larger paper and folded in.

However, there are many tables that can be fitted to the page by a simple recasting. Look at this table:

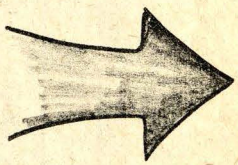


Table 35.--Volume of softwood timber suitable for pulp and paper manufacture, by regions, 1944

Species	New England	Middle Atlantic	Lake	Central	South	Pacific Coast	North Rocky Mountain	South Rocky Mountain	Total
	1,000 cords	1,000 cords	1,000 cords	1,000 cords	1,000 cords	1,000 cords	1,000 cords	1,000 cords	1,000 cords
Spruce and fir	45,030	5,931	17,526	610	781	205,861	48,174	107,329	431,242
Hemlock	10,467	9,100	12,619	3,883	3,883	166,974	--	--	206,825
Southern yellow pine	--	8,751	--	10,453	604,321	--	--	--	623,525
White, Norway, and jack pine	24,190	14,575	25,242	848	1,549	--	--	--	66,404
Tamarack	14	--	1,972	--	--	--	--	--	1,986
Total	79,701	38,357	57,359	15,359	610,534	372,655	48,174	107,329	1,329,982

This table is too wide to fit upright on the average-size page. Also, it is rather shallow (five lines and total) for running broadside on the page. If you leave it to the printer, he will probably do something like this with it:

Table 35.--Volume of softwood timber suitable for pulp and paper manufacture, by region, 1944

Species	New England	Middle Atlantic	Lake	Central	South
	1,000 cords	1,000 cords	1,000 cords	1,000 cords	1,000 cords
Spruce and fir	45,030	5,931	17,526	610	781
Hemlock	10,467	9,100	12,619	3,962	3,883
Southern yellow pine	--	8,751	--	10,453	604,321
White, Norway, and jack pine	24,190	14,575	25,242	848	1,549
Tamarack	14	--	1,972	--	--
Total	79,701	38,357	57,359	15,873	610,534

Species	Pacific Coast	North Rocky Mountain	South Rocky Mountain	Total
Spruce and fir	205,861	48,174	107,329	431,242
Hemlock	166,974	--	--	206,825
Southern yellow pine	--	--	--	623,525
White, Norway, jack pine	--	--	--	66,404
Tamarack	--	--	--	1,986
Total	372,655	48,174	107,329	1,329,982

That is not much better. Doubling the table up gets it on the page upright, but it wastes space. It is not easy to read. But see how a recasting improves the table and fits it to the page.

Table 35.--Volume of softwood timber suitable for pulp and paper manufacture, by regions, 1944

(In thousands of cords)

Region	Spruce and fir	Hemlock	Southern yellow pine	White, Norway, & jack pine	Tamarack	Total
New England	45,030	10,467	--	24,190	14	79,701
Middle Atlantic	5,931	9,100	8,751	14,575	--	38,357
Lake	17,526	12,619	--	25,242	1,972	57,359
Central	610	3,962	10,453	848	--	15,873
South	781	3,883	604,321	1,549	--	610,534
Pacific Coast	205,861	166,974	--	--	--	372,655
North Rocky Mountain	48,174	--	--	--	--	48,174
South Rocky Mountain	107,329	--	--	--	--	107,329
Total	431,242	206,825	623,525	66,404	1,986	1,329,982

TYPING OF TABLES

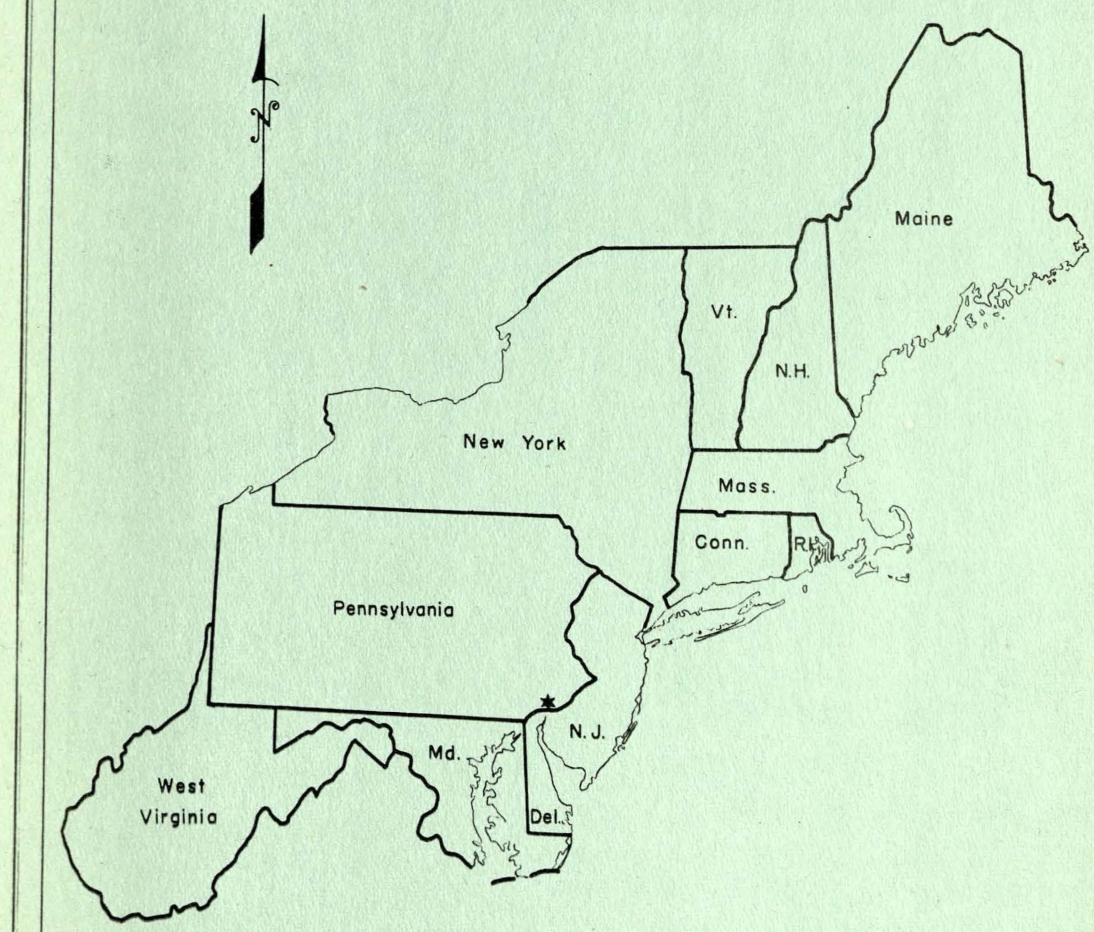
Neat typing helps greatly to make tabular material easy to read, in manuscript as well as in processed material. Here are a few general rules.

1. Type a tabulation (or a list) on the same page with the text lines that introduce it.

2. For manuscripts, type all tables on separate pages. This is required because in printed publications tables are usually set in type of different size; and in processed publications tables must often be reduced photographically.

3. Tables may be typed either single-space or double-space. Double-spacing often improves the appearance and proportions of a shallow table.

4. A table should be compact, but not crowded. A little white space in the box head and between the columns makes the items easier to read.



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